IGNITION/GLOW PLUG SYSTEM

IGNITION, SERVICING

General notes on ignition system

- This section deals specifically with ignition-related components. The other components of the injection and ignition system. See **MULTIPORT FUEL INJECTION (MFI)** .
- For the electric components to work properly, a voltage of at least 11.5 V is required.
- The battery must only be disconnected and connected with the ignition switched off, since the Engine Control Module (ECM) can otherwise be damaged.
- The Engine Control Module (ECM) is equipped with an On Board Diagnostic (OBD)
- Components marked with * are tested via On Board Diagnostic (OBD). See **DIAGNOSTIC MODE 3: CHECK DTC MEMORY** .
- It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore the following work steps must be performed in the mentioned sequence after ending all tests and repairs.
  - Check DTC memory. See **DIAGNOSTIC MODE 3: CHECK DTC MEMORY** .
  - Erase DTC memory. See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
  - For completion, generate readiness code. See **READINESS CODE, GENERATING** .

Parts of ignition, removing and installing:

- Vehicles with engine code AEG. See **PARTS OF THE IGNITION, REMOVING AND INSTALLING (VEHICLES WITH ENGINE CODE AEG)** .
- Vehicles with engine code AVH, AZG, BDC. See **PARTS OF THE IGNITION, REMOVING AND INSTALLING (VEHICLES WITH ENGINE CODE AVH, AZG, BDC)** .

Safety precautions. See **SAFETY PRECAUTIONS** .

Test data, spark plugs. See **TEST DATA, SPARK PLUGS** .

Parts of the ignition, removing and installing (Vehicles with engine code AEG)

NOTE: Engine Control Module (ECM) with harness connectors. See item 5 in OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AEG) .

NOTE: The following list refers to Fig. 1 .

1. **10 Nm**
2. **Ignition wire**
   - 4 to 8 k ohm
   - with interference suppression connector and spark plug connector
3. **Spark plug, 30 Nm**
   - Type and spark plug gap. See **TEST DATA, SPARK PLUGS** .
4. **20 Nm**
   - Tightening torque affects function of Knock Sensor (KS)
5. **Knock Sensor (KS) 2 (G66)***
   - Component location. See item 14 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AEG)** .
   - Terminals of sensor and connector are gold-plated
   - contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease
   - Checking. See **CHECK KNOCK SENSORS** .
6. **Connector**
   - brown, 2-pin
   - For Knock Sensor (KS) 2 -G66-
   - before disconnecting, mark allocation of connector to component
   - Terminals of sensor and connector are gold-plated
7. **Knock Sensor (KS) 1 (G61)***
   - Component location. See item 15 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AEG)** .
   - Terminals of sensor and connector are gold-plated
   - contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease Checking. See **CHECK KNOCK SENSORS** .
8. **Connector**
   - black, 2-pin
   - For Knock Sensor (KS) 1 -G61-
   - before disconnecting, mark allocation of connector to component
   - Terminals of sensor and connector are gold-plated
9. **Camshaft Position (CMP) sensor (G40)***
   - Component location. See item 17 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AEG)** .
   - Terminals of sensor and connector are gold-plated
   - Checking. See **CHECK CAMSHAFT POSITION (CMP) SENSOR** .
10. **Connector**
    - black, 3-pin
    - For Camshaft Position (CMP) sensor 2 -G40-

- Terminals of sensor and connector are gold-plated

11. **Connector**
    - Black, 4-pin
    - for Ignition Coil -N152-
12. **Ignition Coil -N152-***

- Component location. See item 12 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AEG)** .
- with marking for ignition wires: A = Cylinder 1B = Cylinder 3C = Cylinder 2D = Cylinder 4
- Checking. See **CHECKING IGNITION COIL (VEHICLES WITH ENGINE CODE AEG)** .

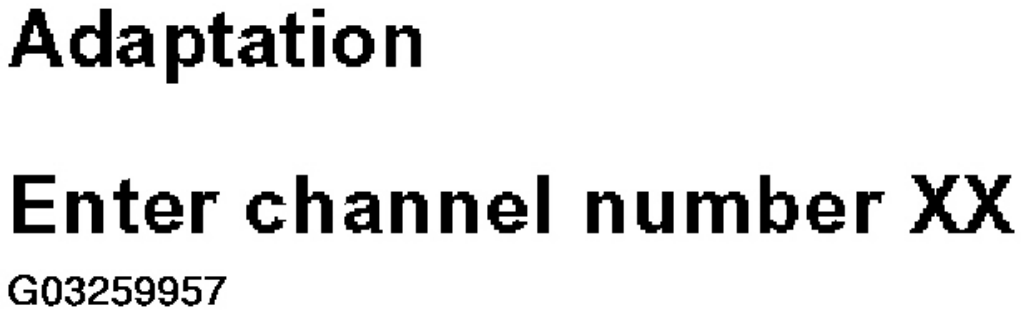


Fig. 1: Identifying Parts Of Ignition System (Vehicles With Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Parts of the ignition, removing and installing (Vehicles with engine code AVH, AZG, BDC)

NOTE: Engine Control Module (ECM) with connectors:

- Vehicles with engine code AVH, AZG. See item 11 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AVH, AZG)** .
- Vehicles with engine code BDC. See item 12 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE BDC)** .

NOTE: The following list refers to Fig. 2 .

1. **Ignition wire**
    - 4 to 8 k ohm
    - with interference suppression connector and spark plug connector

2. Ignition coil with power output stage (-N70-, -N127-, -N291-, -N292-)*
   - Ignition wires connection: HV1 = Cylinder 1HV2 = Cylinder 2HV3 = Cylinder 3HV4 = Cylinder 4
   - Checking. See **CHECKING IGNITION COILS WITH POWER OUTPUT STAGES (VEHICLES WITH ENGINE CODE AVH, AZG, BDC)** .

     Component location:

   - Vehicles with engine code AVH, AZG. See item 18 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AVH, AZG)** .
   - Vehicles with engine code BDC. See item 19 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE BDC)** .
3. **10 Nm**
4. **Connector**
   - 6-pin
5. **Knock Sensor (KS) 1 (G61)***
   - contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease
   - Terminals of sensor and connector are gold-plated
   - Checking. See **CHECK KNOCK SENSORS** .

     Component location:

   - Vehicles with engine code AVH, AZG. See item 27 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AVH, AZG)** .
   - Vehicles with engine code BDC. See item 25 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE BDC)** .
6. **Connector**
   - 2-pin
   - For Knock Sensor (KS) 1 -G61-
   - before disconnecting, mark allocation of connector to component
   - Terminals of sensor and connector are gold-plated
7. **Knock Sensor (KS) 2 (G66)***
   - contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease
   - Terminals of sensor and connector are gold-plated
   - Checking. See **CHECK KNOCK SENSORS** .

     Component location:

   - Vehicles with engine code AVH, AZG. See item 24 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AVH, AZG)** .
   - Vehicles with engine code BDC. See item 24 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE BDC)** .

8. **Connector**
    - 2-pin
    - For Knock Sensor (KS) 2 -G66-
    - before disconnecting, mark allocation of connector to component
    - Terminals of sensor and connector are gold-plated
9. **Connector**
    - 2-pin
    - For Knock Sensor (KS) 1 -G61-
    - before disconnecting, mark allocation of connector to component
    - Terminals of sensor and connector are gold-plated
10. **Spark plug, 30 Nm**
    - Type and spark plug gap. See **TEST DATA, SPARK PLUGS** .
11. **Connector**
    - 3-pin
    - For Camshaft Position (CMP) sensor 2 -G40-
    - Terminals of sensor and connector are gold-plated
12. **10 Nm**
13. **100 Nm**
    - Use Retainer (3415) when loosening or tightening
14. **Camshaft gear**
    - with trigger wheel for Camshaft Position (CMP) Sensor -G40-
15. **Camshaft Position (CMP) sensor (G40)***
    - Terminals of sensor and connector are gold-plated
    - Checking. See **CHECK CAMSHAFT POSITION (CMP) SENSOR** .

      Component location:

    - Vehicles with engine code AVH, AZG. See item 2 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE AVH, AZG)** .
    - Vehicles with engine code BDC. See item 4 in **OVERVIEW OF COMPONENT LOCATIONS (VEHICLES WITH ENGINE CODE BDC)** .
16. **Bracket**
    - for Camshaft Position (CMP) sensor

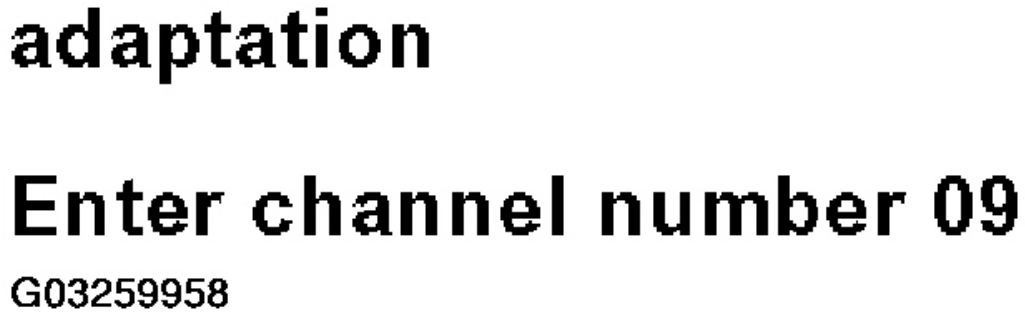


Fig. 2: Identifying Parts Of Ignition System (Vehicles With Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Safety precautions

WARNING: Observe the following for all installations, especially in engine compartment due to lack of room:

- **Route lines of all types (e.g. for fuel, hydraulic, EVAP canister system, coolant and refrigerant, brake fluid, vacuum) and electrical wiring so that the original path is followed.**
- **Watch for sufficient clearance to all moving or hot components.**
- **Fuel system is under pressure! Before opening system, place rags around the connection point. Then release pressure by carefully loosening connection.**

If test and measuring equipment is required during road test, note the following:

- Test equipment must always be secured to the rear seat and operated from there by a second person.

  If test and measuring equipment is operated from the passenger seat, the person seated there could be injured in the event of an accident involving deployment of the passenger -side airbag.

  To reduce the risk of personal injury and/or damage to the fuel injection and ignition system, always observe the following:

- Do not touch or disconnect ignition wires when engine is running or turning at starting RPM.
- Only disconnect and reconnect wires for injection and ignition system, including test leads, when ignition is switched off.
- If engine is to be cranked at starting RPM without starting, e.g. for a compression test:

Vehicles with engine code AEG

- Disconnect 4-pin connector from Ignition Coil -N152- (arrow).

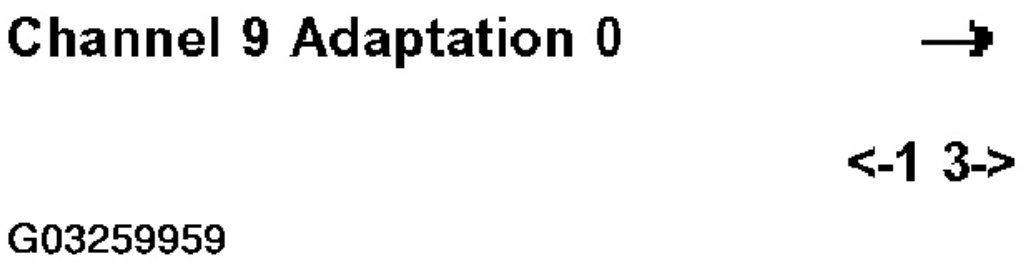


Fig. 3: Disconnecting 4-Pin Connector From Ignition Coil -N152- (AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with engine code AVH, AZG, BDC

- Disconnect the 6-pin connector from the power output stage for ignition coils (arrow).

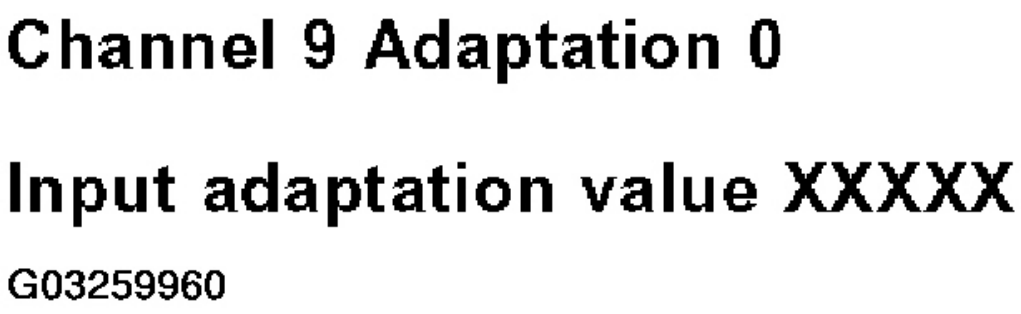


Fig. 4: Disconnecting 6-Pin Connector From Power Output Stage For Ignition Coils (AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Continuation for all vehicles

- Remove fuse 32 from fuse holder.

NOTE: By removing fuse 32, voltage supply to the fuel injectors is interrupted.

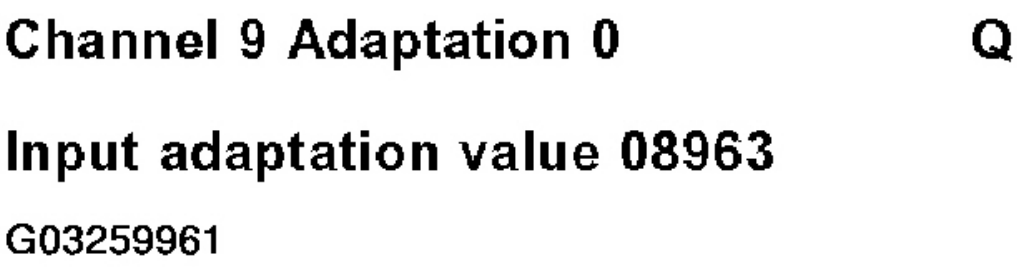


Fig. 5: Locating Fuse 32
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Fuse holder is located behind access panel at far left end of dash.

Test Data, Spark Plugs

SPARK PLUGS TEST DATA

Engine Code	**AEG**	**AVH, AZG, BDC**
Ignition sequence	1-3-4-2	1-3-4-2
Spark plugs		
VW/Audi	101 000 033 AA	101 000 062 AB
Manufacturer code	BKUR 6ET-10	PZF R5D-11
Tightening torque	30 Nm	30 Nm
Spark plug gap	max. 0.9 to 1.1 mm	max. 0.9 to 1.1 mm
Engine Control Module (ECM)(1)		
System identification	Motronic M5.9.2	Motronic ME7.5
Terminals at Engine Control Module (ECM)	80	121
Part number	See Parts catalog	See Parts catalog
Engine speed (RPM) limitation	starting at approx. 6300 RPM	starting at approx. 6300 RPM
(1) Replacing Engine Control Module (ECM). See **REPLACING ENGINE CONTROL MODULE (ECM)** .		

Check Camshaft Position (CMP) sensor

Recommended special tools and equipment

- VAG1526 multimeter or VAG1715 multimeter
- VAG1594 connector test kit
- Wiring diagram

Test requirements

- The respective fuses of Motronic Engine Control Module (ECM) -J220- must be OK.

NOTE: Fuse holder is located behind access panel at far left end of dash.

Fig. 6: Identifying Fuses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Battery voltage must be at least 11.5 volts.
- All electrical consumers such as, for example, lights and rear window defroster must be switched off.
- Parking brake must be engaged or else daylight driving lights will be switched on.
- Ground (GND) connections between engine and chassis must be OK.

Test sequence (Vehicles with engine code AEG)

Test sequence (Vehicles with engine code AVH, AZG, BDC). See **TEST SEQUENCE (VEHICLES WITH ENGINE CODE AVH, AZG, BDC)** .

- Remove engine cover.
- Disconnect the 3-pin connector from Camshaft Position (CMP) Sensor -G40- (arrow).

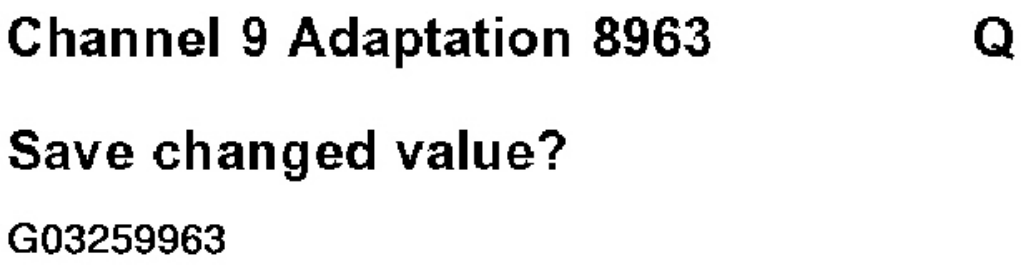


Fig. 7: Disconnecting 3-Pin Connector From Camshaft Position Sensor -G40- (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect multimeter to terminal 1 (B+) and 3 (Ground -GND-) of connector for Camshaft Position (CMP) sensor for voltage measurement.

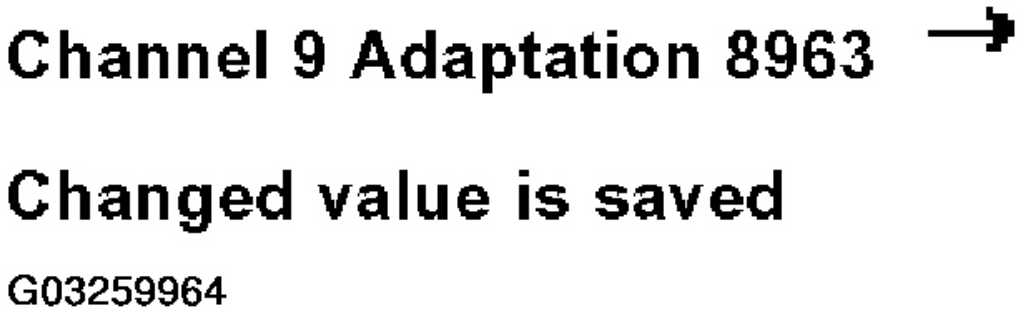


Fig. 8: Connecting Multimeter To ECT Sensor Harness Connector Terminal 1 And 3 Of (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ignition on. Specified value: at least 4.5 V
- Switch ignition off.

If there is no voltage:

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .

- Check for open circuits in wires between test box and connector according to wiring diagram.

  Terminal 1 + socket 62

  Terminal 2 + socket 76

  Terminal 3 + socket 67

  Wire resistance: max. 1.5 ohm

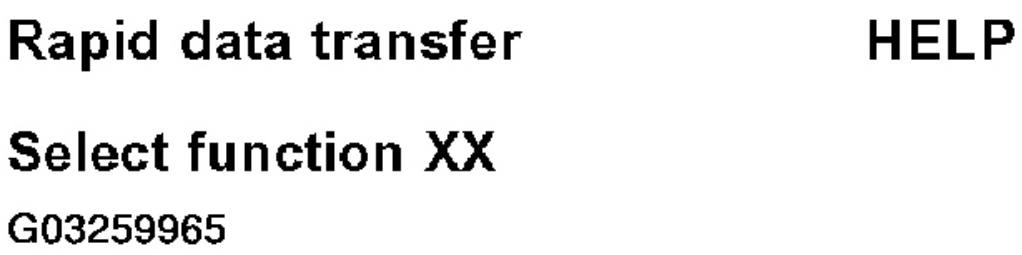


Fig. 9: Identifying ECT Sensor Harness Connector Terminals (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

  If no malfunctions are found in the wires and there was voltage between terminals 1 + 3:

- Replace Camshaft Position (CMP) Sensor -G40-. See item 9 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

If no malfunctions are found in wires and there was no voltage between terminals 1 + 3:

- Replace Motronic Engine Control Module (ECM) -J220-. See **REPLACING ENGINE CONTROL MODULE (ECM)** .

Test sequence (Vehicles with engine code AVH, AZG, BDC)

- Disconnect the 3-pin connector from Camshaft Position (CMP) Sensor (arrow).

Fig. 10: Disconnecting 3-Pin Connector From Camshaft Position Sensor (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect multimeter to terminal 1 (B+) and 3 (Ground -GND-) of connector for Camshaft Position (CMP) sensor for voltage measurement.

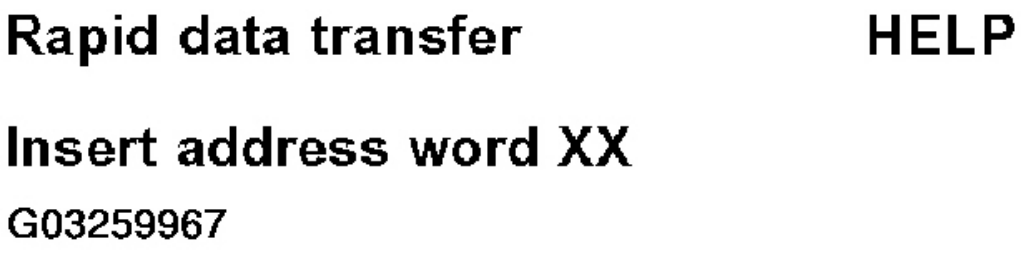


Fig. 11: Connecting Multimeter To Camshaft Position Sensor Harness Connector Terminal 1 And 3 (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ignition on. Specified value: 4.0 to 6.0 V
- Switch ignition off.

If there is no voltage:

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .
- Check for open circuits in wires between test box and connector according to wiring diagram.

Terminal 1 + socket 98

Terminal 2 + socket 86

Terminal 3 + socket 108

Wire resistance: max. 1.5 ohm

Fig. 12: Identifying Camshaft Position Sensor Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

  If no malfunctions are found in the wires and there was voltage between terminals 1 + 3:

- Replace Camshaft Position (CMP) Sensor -G40-. See item 15 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

  If no malfunctions are found in wires and there was no voltage between terminals 1 + 3:

- Replace Motronic Engine Control Module (ECM) -J220-. See **REPLACING ENGINE CONTROL MODULE (ECM)** .

Check knock sensors

NOTE:

- **Contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease.**
- **For the Knock Sensors to function properly, it is important for tightening torque to be exactly 20 Nm.**

- **Use only gold-plated terminals when servicing terminals in harness connector of knock sensors.**

Recommended special tools and equipment

- VAG1526 multimeter or VAG1715 multimeter
- VAG1594 connector test kit
- Wiring diagram

Test requirements

- Securing bolt for knock sensors tightened to 20 Nm.
- Ignition switched off.

Checking resistances and wires (Vehicles with engine code AEG)

- Checking resistances and wires (Vehicles with engine code AVH, AZG, BDC). See **CHECKING RESISTANCES AND WIRES (VEHICLES WITH ENGINE CODE AVH, AZG, BDC)** .
- Disconnect 2-pin connectors from knock sensors.

1. Knock Sensor (KS) 1 -G61-
2. Knock Sensor (KS) 2 -G66-

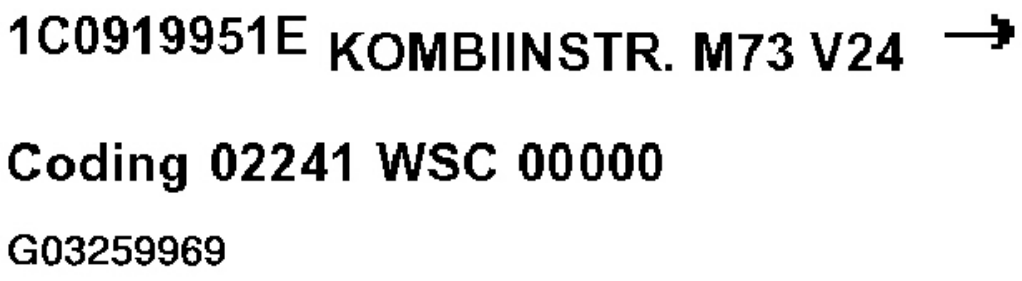


Fig. 13: Disconnecting 2-Pin Connectors From Knock Sensors (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Before disconnecting harness connectors, mark allocation to component.

- Measure resistance between terminals 1 + 2 at connectors to knock sensors. Specified value: INFINITY ohm

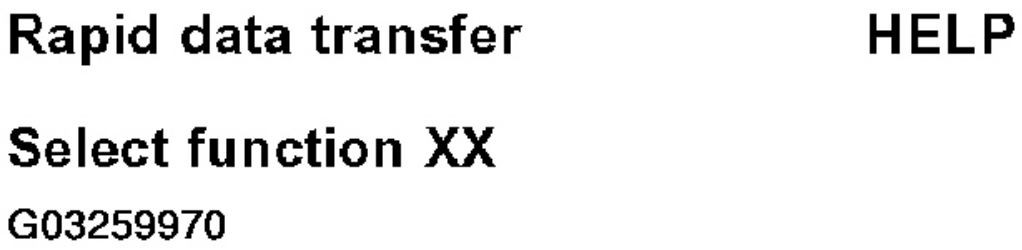


Fig. 14: Measuring Resistance Between Knock Sensor Terminals 1 And 2 (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .
- Check wires between test box and 2-pin connector to Engine Control Module (ECM) for open circuit according to wiring diagram. Wire resistance: max. 1.5ohm

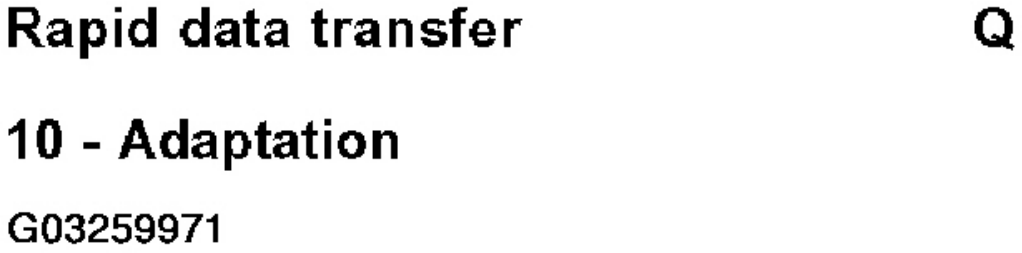


Fig. 15: Identifying Knock Sensor 2-Pin Harness Connector Terminals (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

KNOCK SENSOR WIRING TEST (ENGINE CODE AEG)

Component	Connector	Test box
Knock Sensor (KS) 1 -G61-	Terminal 1	Socket 68
	Terminal 2	Socket 67
Knock Sensor (KS) 2 -G66-	Terminal 1	Socket 60
	Terminal 2	Socket 67

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

If resistances and wires are OK:

- Replace the respective knock sensor:
  - Knock Sensor (KS) 1 -G61-. See item 7 .
  - Knock Sensor (KS) 2 -G66-. See item 5 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

Checking resistances and wires (Vehicles with engine code AVH, AZG, BDC)

- Disconnect 2-pin connectors from knock sensors.

1. Knock Sensor (KS) 1 -G61-
2. Knock Sensor (KS) 2 -G66-

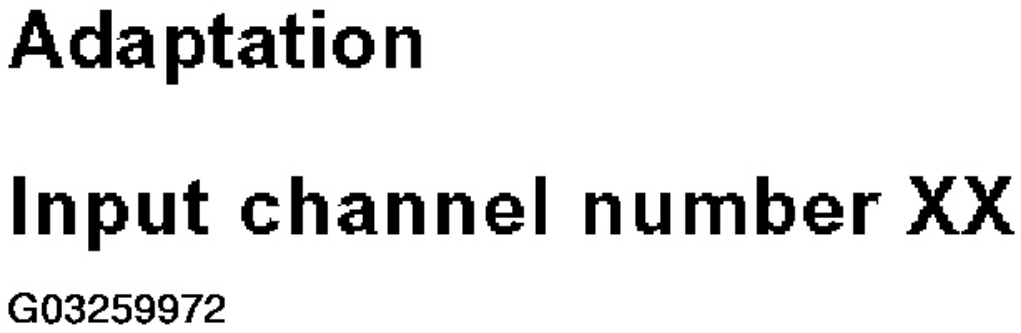


Fig. 16: Disconnecting 2-Pin Connectors From Knock Sensors (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Before disconnecting harness connectors, mark allocation to component.

- Measure resistance between terminals 1 + 2 at connectors to knock sensors. Specified value: INFINITY ohm

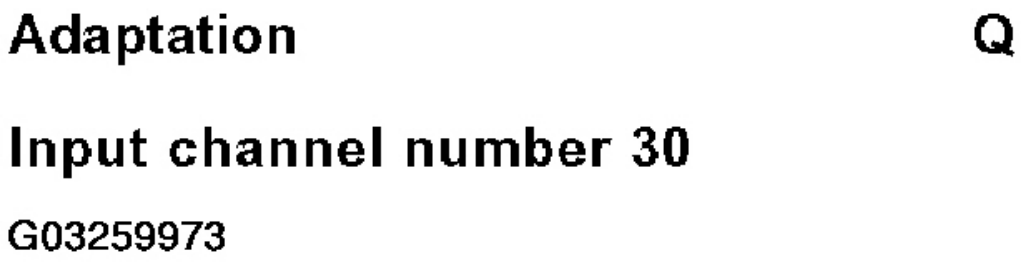


Fig. 17: Measuring Resistance Between Knock Sensor Terminals 1 And 2 (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .
- Check wires between test box and 2-pin connector to Engine Control Module (ECM) for open circuit according to wiring diagram. Wire resistance: max. 1.5 ohm

Fig. 18: Identifying Knock Sensor 2-Pin Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

KNOCK SENSOR WIRING TEST (ENGINE CODE AVH, AZG, BDC)

Component	Connector	Test box
Knock Sensor (KS) 1 -G61-	Terminal 1	Socket 106
	Terminal 2	Socket 99
Knock Sensor (KS) 2 -G66-	Terminal 1	Socket 107

	Terminal 2	Socket 99

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

  If resistances and wires are OK:

- Replace the respective knock sensor:
  - Knock Sensor (KS) 1 -G61-. See item 5 .
  - Knock Sensor (KS) 2 -G66-. See item 7 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

Checking ignition coil (Vehicles with engine code AEG)

Recommended special tools and equipment

- VAG1526 multimeter or VAG1715 multimeter
- VAG1527 voltage test lamp
- VAG1594 connector test kit
- Wiring diagram

Test requirements

- The respective fuses of Ignition Coil -N152- must be OK.

NOTE: Fuse holder is located behind access panel at far left end of dash.

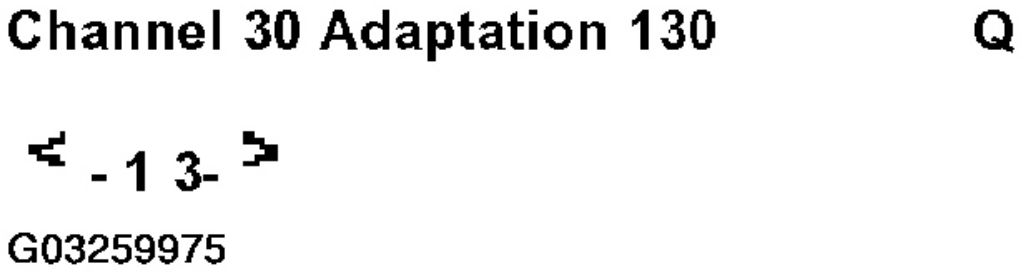


Fig. 19: Identifying Fuses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Fuel Pump (FP) Relay -J17- must be OK, check:
- Battery voltage must be at least 11.5 volts.
- All electrical consumers such as, for example, lights and rear window defroster must be switched off.
- Parking brake must be engaged or else daylight driving lights will be switched on.
- For vehicles with automatic transmission, selector lever must be in position -P- or -N-.
- If vehicle is equipped with an A/C system, it must be switched off.
- Ground (GND) connections between engine and chassis must be OK.
- Engine speed (RPM) sensor must be OK, checking. See **CHECK ENGINE SPEED (RPM) SENSOR** .
- Camshaft Position (CMP) sensor must be OK, checking. See **CHECK CAMSHAFT POSITION (CMP) SENSOR** .
- Ignition switched off.

Test sequence

- Disconnect 4-pin connector from Ignition Coil -N152- (arrow).

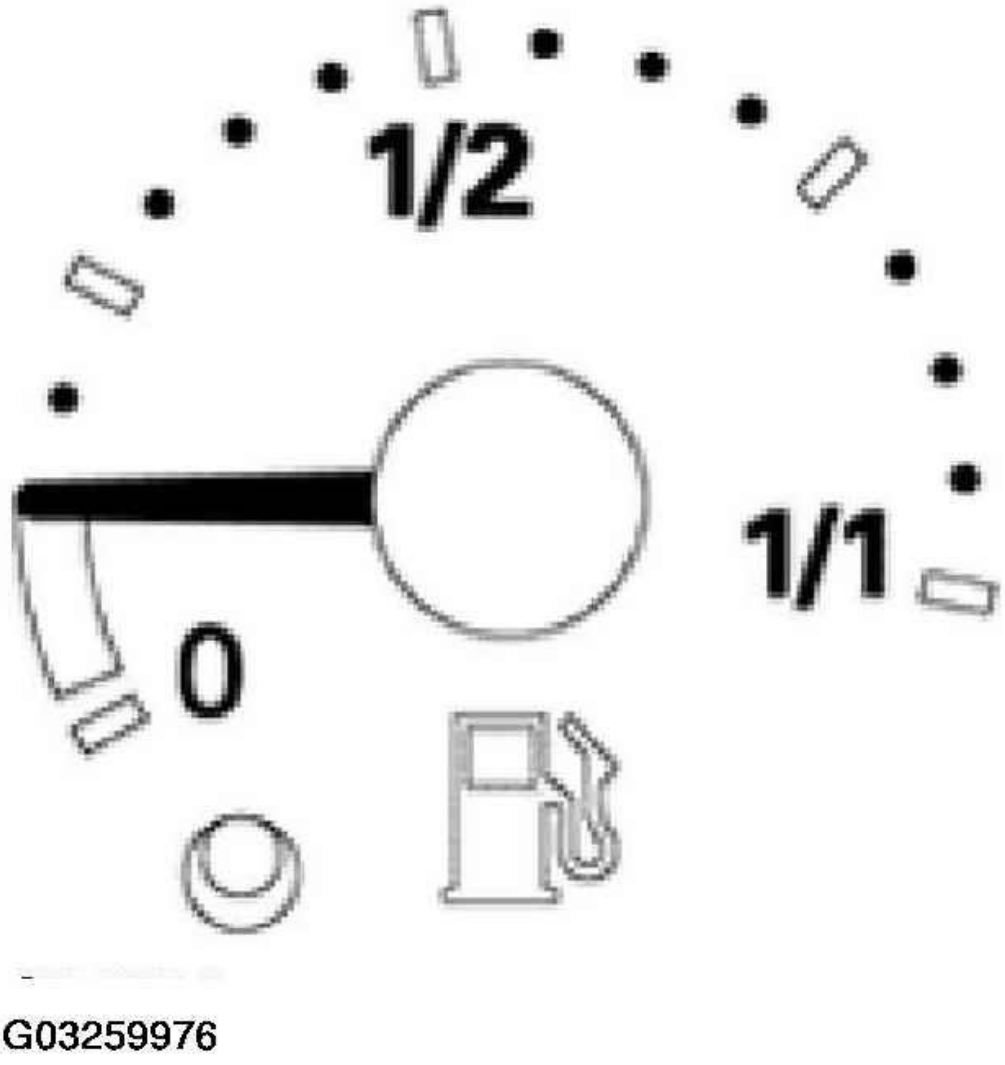


Fig. 20: Disconnecting 4-Pin Connector From Ignition Coil -N152- (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking voltage supply

- Connect multimeter to terminals 2 + 4 of the disconnected connector for voltage measurement.

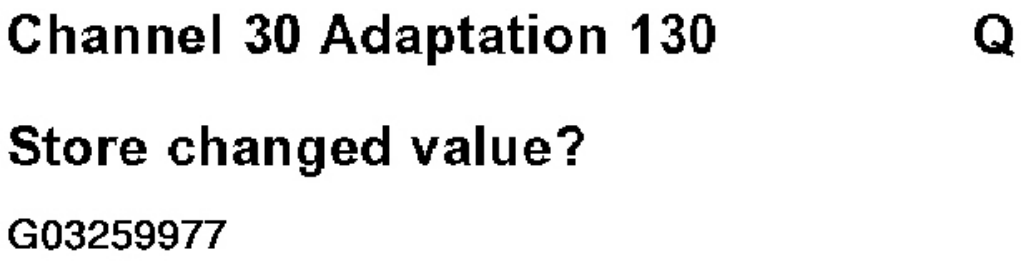


Fig. 21: Connecting Multimeter To Igntion Coil Harness Connector Terminals 2 And 4 (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch on ignition. Specified value: at least 11.5 V
- Switch ignition off.

If there is no voltage:

- Check wire between 4-pin connector terminal 2 and relay carrier for open circuits according to wiring diagram. Wire resistance: max. 1.5 ohm

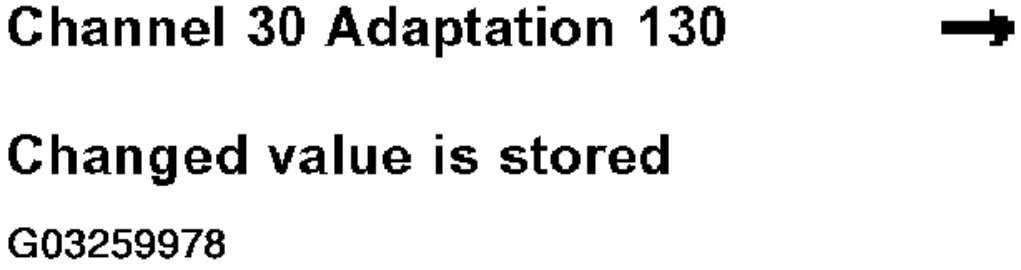


Fig. 22: Identifying Igntion Coil Harness Connector Terminals (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check for open circuit in wire between 4-pin connector terminal 4 and Ground (GND) according to wiring diagram. Wire resistance: max. 1.5 ohm

If there is no malfunction in voltage supply:

- Check activation. See **CHECKING ACTIVATION** .

Checking activation

WARNING: Do not touch ignition coil connecting parts or adapter cables during the following test.

- Remove fuse 32 from fuse holder. Fuse holder is located behind access panel at far left end of dash.

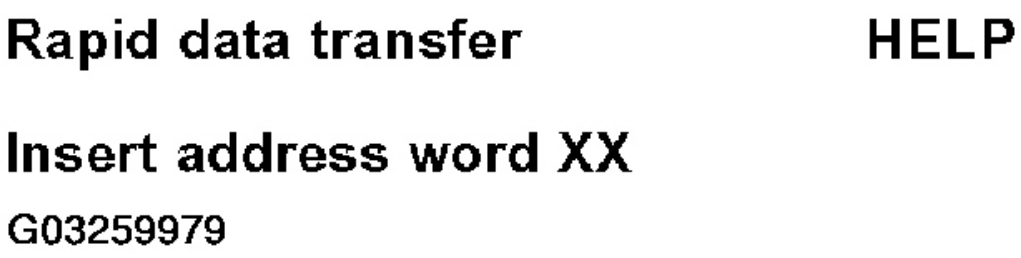


Fig. 23: Locating Fuse 32
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: By removing fuse 32, voltage supply to the fuel injectors is interrupted.

- Using adapter cables, connect voltage tester (VAG1527) to terminals 1 + 4 (ignition output 1), terminals 3 + 4 (ignition output 2), of disconnected connector.

Fig. 24: Identifying Ignition Coil Harness Connector Terminals (Engine Code AEG)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate starter and test ignition signal from Engine Control Module (ECM). LED should flicker.
- Switch ignition off.

If LED flickers and voltage supply is OK:

- Replace Ignition Coil -N152-. See item 12 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

If LED does not flicker:

- Check wires. See **CHECKING WIRING** .

Checking wiring

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .
- Check wires between test box and 4-pin connector for open circuit according to wiring diagram.

Terminal 1 + socket 71

Terminal 3 + socket 78

Wire resistance: max. 1.5 ohm

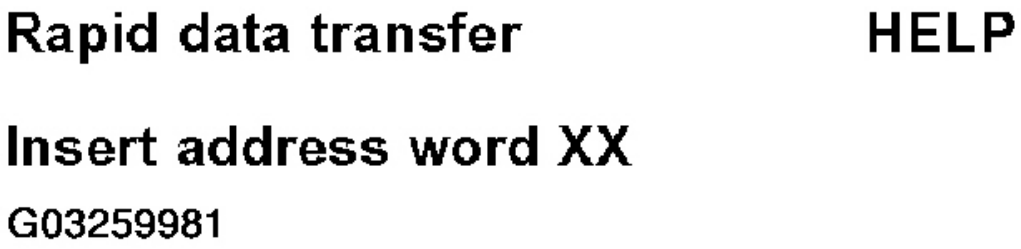


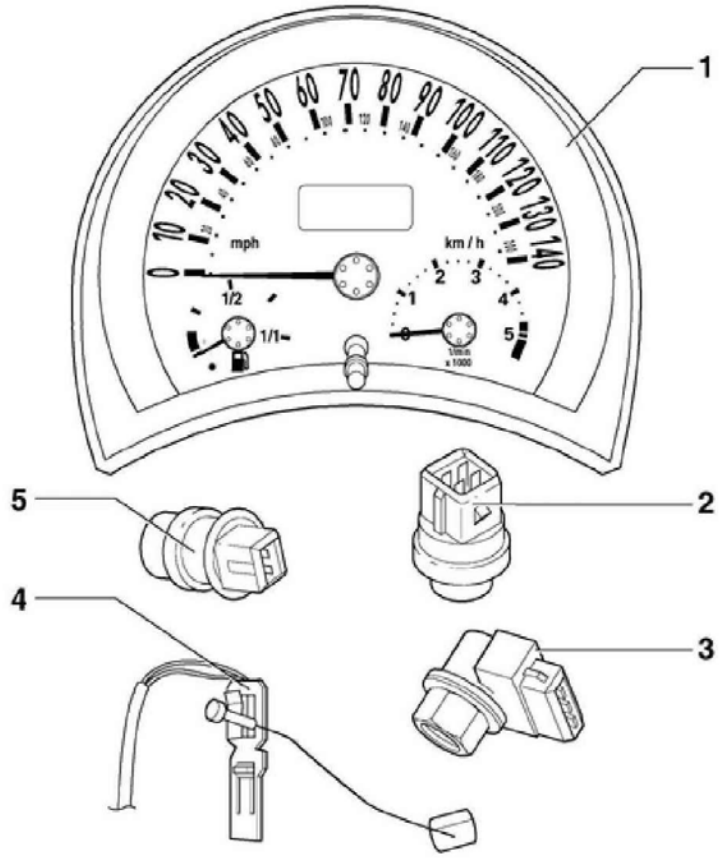
Fig. 25: Identifying Ignition Coil Harness Connector Terminals (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

- If no malfunctions are found in the wires and there was voltage between terminal 2 + 4:
- Replace Motronic Engine Control Module (ECM) -J220-. See **REPLACING ENGINE CONTROL MODULE (ECM)** .

Checking secondary resistances

- Check secondary resistances at terminal 4 between Cyl. 1 + Cyl. 4, Cyl. 2 + Cyl. 3. Specified value: 4.0... 6.0 k ohm



1 - Instrument cluster -K-

2 - Engine coolant temperature (ECT) sensor -G2-

3 - Speedometer vehicle speed sensor (VSS) -G22-

4 - Sender for fuel gauge sender -G-

5 - Outside air temperature sensor -G17-

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Fig. 26: Checking Secondary Resistances At Terminal 4 Between Cyl. 1 And Cyl. 4, Cyl. 2 And Cyl. 3 (Engine Code AEG)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specified values are not obtained:

- Replace Ignition Coil -N152-. See item 12 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

Checking ignition coils with power output stages (Vehicles with engine code AVH, AZG, BDC)

NOTE: Ignition coils and power output stages are one component and cannot be replaced individually.

Special tools and equipment

- VAG1526 multimeter or VAG1715 multimeter
- VAG1527 voltage test lamp
- VAG1594 connector test kit
- VAG1598/31 test box
- Wiring diagram

Test requirements

- The respective fuses of ignition coils must be OK.

NOTE: Fuse holder is located behind access panel at far left end of dash.

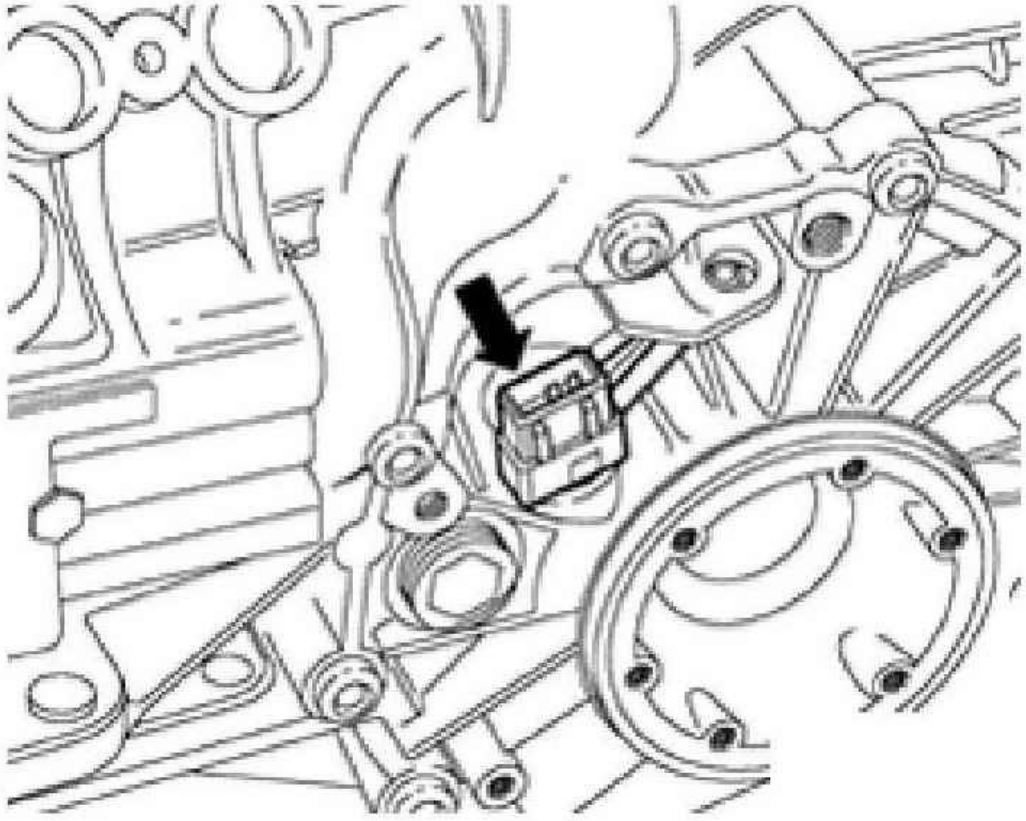

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Fig. 27: Identifying Fuses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Motronic Engine Control Module (ECM) Power Supply Relay -J271- must be OK.
- Battery voltage must be at least 11.5 volts.
- All electrical consumers such as, for example, lights and rear window defroster must be switched off.
- Parking brake must be engaged or else daylight driving lights will be switched on.
- For vehicles with automatic transmission, selector lever must be in position -P- or -N-.
- If vehicle is equipped with an A/C system, it must be switched off.
- Ground (GND) connections between engine and chassis must be OK.
- Engine speed (RPM) sensor must be OK, checking. See **CHECK ENGINE SPEED (RPM) SENSOR** .
- Camshaft Position (CMP) sensor must be OK, checking. See **CHECK CAMSHAFT POSITION (CMP) SENSOR** .
- Ignition switched off.

Test sequence

- Disconnect the 6-pin connector from the power output stage for ignition coils (arrow).

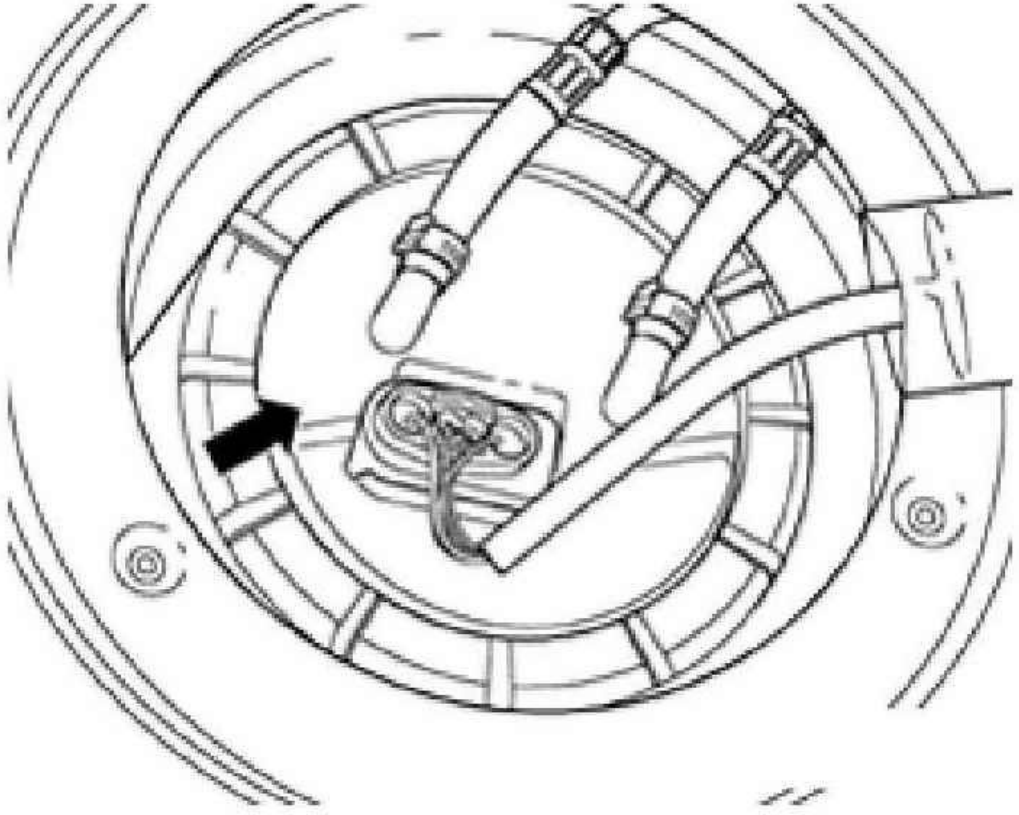

Fig. 28: Disconnecting 6-Pin Connector From Power Output Stage For Ignition Coils (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking voltage supply

- Use multimeter and adapter cables to measure voltage supply between terminals 1 + 6 of the disconnected connector.

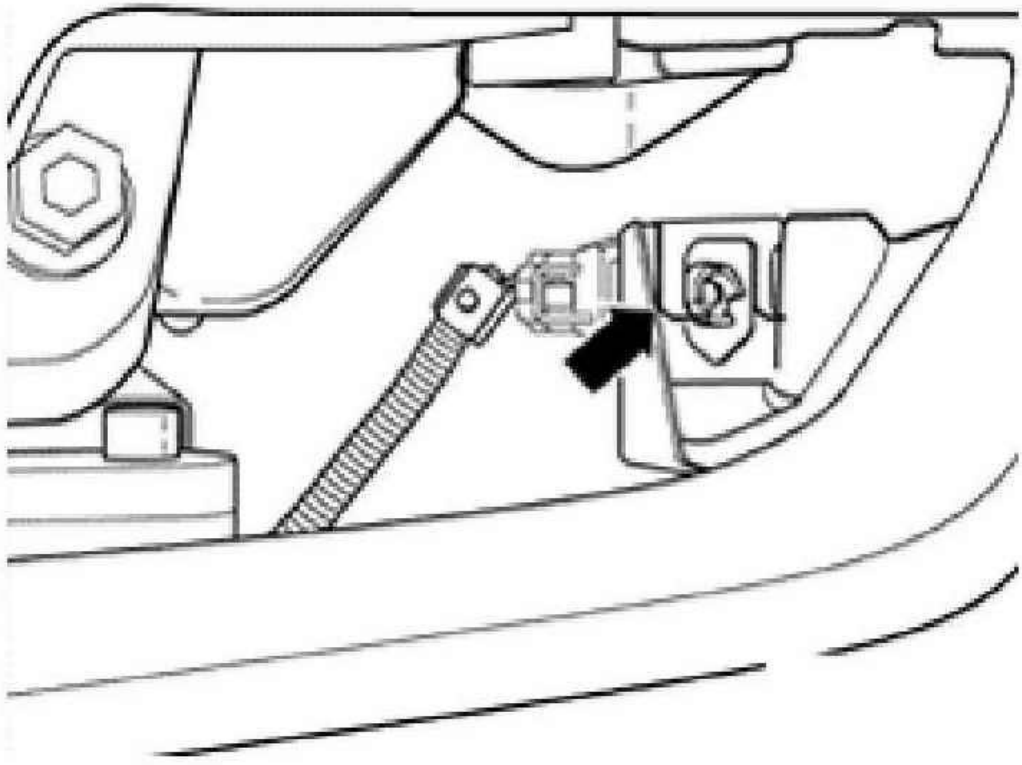

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Fig. 29: Identifying Ignition Coil 6-Pin Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch on ignition. Specified value: at least 11.5 V
- Switch ignition off.

If there is no voltage:

- Check wire between 6-pin connector terminal 6 and Motronic Engine Control Module (ECM) Power Supply Relay -J271- for open circuit according to wiring diagram. Wire resistance: max. 1.5 ohm

Fig. 30: Identifying Ignition Coil 6-Pin Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wires between 6-pin connector terminal 1 and Ground (GND) for open circuit according to wiring diagram. Wire resistance: max. 1.5 ohm

If there is no malfunction in voltage supply:

- Check activation. See **CHECKING ACTIVATION** .

Checking activation

WARNING: Do not touch ignition coil connecting parts or adapter cables during the following test.

- Remove fuse 32 from fuse holder. Fuse holder is lcoated behind access panel at far left end of dash.

Fig. 31: Locating Fuse 32
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: By removing fuse 32, voltage supply to the fuel injectors is interrupted.

- Using adapter cables, connect voltage tester (VAG1527) to

  Terminals 1 + 2 (ignition output 1)

  Terminals 1 + 3 (ignition output 2)

  Terminals 1 + 4 (ignition output 3)

  Terminals 1 + 5 (ignition output 4) of disconnected connector.

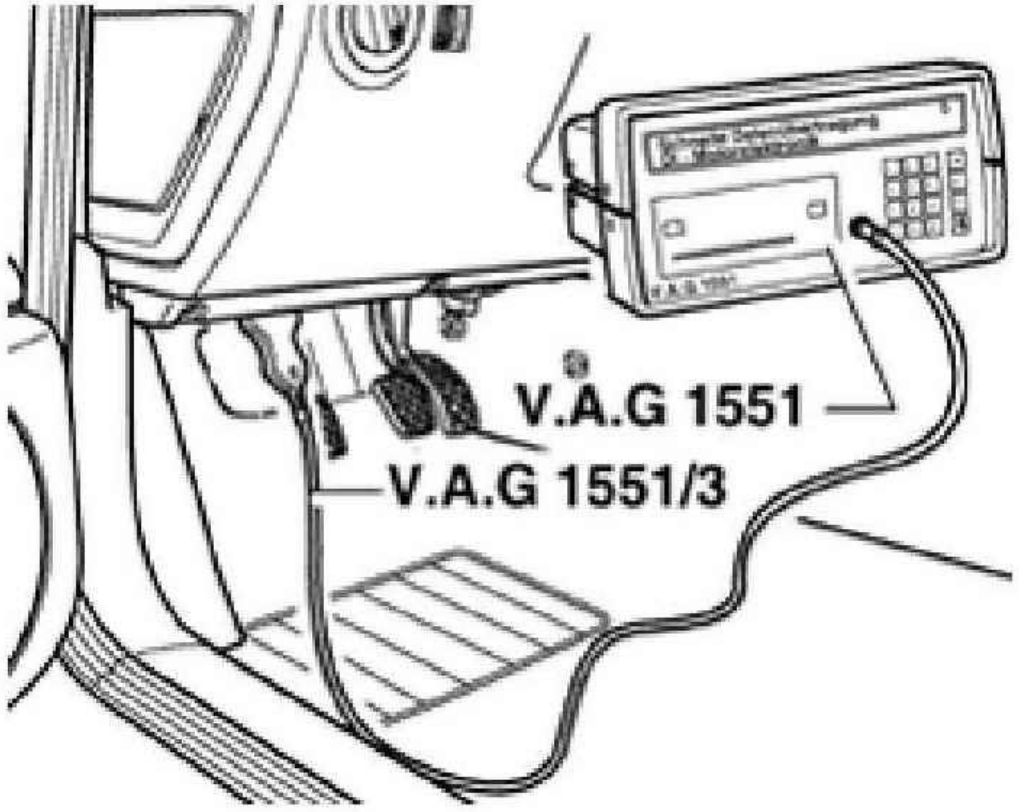

Fig. 32: Identifying Ignition Coil 6-Pin Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate starter and test ignition signal from Engine Control Module (ECM). LED should flicker.
- Switch ignition off.

If LED flickers and voltage supply is OK:

- Replace ignition coil with power output stage (-N70-, -N127-, -N291-, -N292-). See item 2 .
- Erase DTC memory of Engine Control Module (ECM). See **DIAGNOSTIC MODE 4: RESET/ERASE DIAGNOSTIC DATA** .
- Generate readiness code. See **READINESS CODE, GENERATING** .

If LED does not flicker:

- Check wires. See **CHECKING WIRING** .

Checking wiring

- Connect test box to control module wiring harness. See **TEST BOX FOR WIRING TEST, CONNECTING** .
- Check wires between test box and 6-pin connector for open circuit according to wiring diagram.

  Cylinder 1 terminal 2 + socket 102

  Cylinder 2 terminal 3 + socket 95

  Cylinder 3 terminal 4 + socket 103

  Cylinder 4 terminal 5 + socket 94

  Wire resistance: max. 1.5ohm

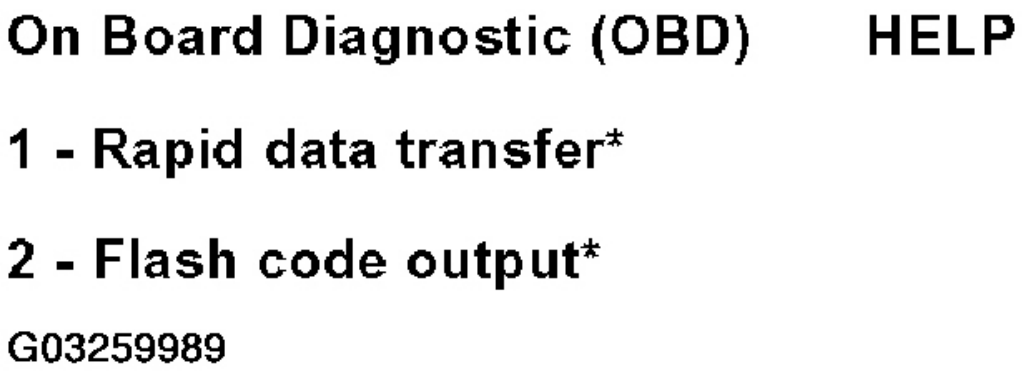

Fig. 33: Identifying Ignition Coil 6-Pin Harness Connector Terminals (Engine Code AVH, AZG, BDC)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Also check wires for short circuit to each other. Specified value: INFINITY ohm

  If there is no malfunction in wire connections:

- Replace Motronic Engine Control Module (ECM) -J220-. See **REPLACING ENGINE CONTROL MODULE (ECM)** .